

Sequences and Series: math test solutions, Grade 11 – download the PDF

Test solutions with the detailed point scale. Add up your points and spot what to review.

Suggested time: 45 minutes. Out of 20 points. Calculator allowed only when the problem says so.

1 Two sequences

/ 4 pts

(a) Arithmetic, $d = 5$: $a_n = 11 + 5(n - 1) = 5n + 6$ (1 pt). $a_{25} = 131$ (1 pt).

(b) Geometric, $r = \frac{1}{3}$: $a_n = 243 \left(\frac{1}{3}\right)^{n-1}$ (1 pt). $a_6 = 243 \cdot \frac{1}{243} = 1$ (1 pt).

2 Recursive rule

/ 3 pts

(a) 4, 1, -2, -5 (1 pt).

(b) $a_n = 4 - 3(n - 1) = 7 - 3n$ (1 pt).

(c) $a_{30} = 7 - 90 = -83$ (1 pt).

3 Arithmetic series

/ 4 pts

(a) $d = 4$, $a_{30} = 9 + 29 \cdot 4 = 125$ (1 pt). $S_{30} = \frac{30(9 + 125)}{2} = 2,010$ (1 pt).

(b) $S_n = \frac{n[18 + 4(n - 1)]}{2} = 2n^2 + 7n$ (1 pt). $S_{20} = 940 < 1000$ and $S_{21} = 1,029 > 1000$: 21 terms (1 pt).

4 Finite geometric series

/ 4 pts

(a) $a_1 = 7$, $r = 2$ (1 pt): $S_9 = 7(2^9 - 1) = 7 \cdot 511 = 3,577$ (1 pt).

(b) $a_1 = 4$, $r = \frac{1}{2}$, 6 terms (1 pt): $S_6 = 4 \cdot \frac{1 - \frac{1}{64}}{\frac{1}{2}} = 8 \cdot \frac{63}{64} = \frac{63}{8} = 7.875$ (1 pt).

5 Infinite series

/ 3 pts

(a) $r = \frac{1}{3}$ and $|r| < 1$ (1 pt). $S = \frac{18}{1 - \frac{1}{3}} = 27$ (1 pt).

(b) $r = 2$, and $|r| \geq 1$, so the partial sums grow without bound and the series diverges (1 pt).

6 The pendulum

/ 2 pts

Geometric series with $a_1 = 40$, $r = 0.9$ (1 pt). $S = \frac{40}{1 - 0.9} = 400$ cm, about 4 m (1 pt).



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